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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/559,749	04/27/2000	William J. Imochl	051252-5065	2942

9629 7590 11/01/2002

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EXAMINER

COMPTON, ERIC B

ART UNIT	PAPER NUMBER
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3726

DATE MAILED: 11/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/559,749

Applicant(s)

IMOEHL, WILLIAM J.

Examiner

Eric B. Compton

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-4 and 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-4 and 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2-4, and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 60-019957 to Yuji (JAPAN ELECTRONIC CONTROL SYST CO LTD) in view of Applicant's Admitted Prior Art (AAPA) and US Patent 3,430,388 to Gabrielli.

Yuji discloses a fuel injector valve seat having an orifice portion (14) proximate a downstream face and having a first transverse cross-sectional area, a sealing portion (13) proximate an upstream face and having a second cross-sectional area, and a transition portion (15) interposed between the orifice portion and the sealing portion.

Figures 2 and 3 show the sealing portion and the transition portion decreasing from one area to another and the conical surfaces inherently have an included angle. Furthermore, the first angle is clearly greater than the second angle. Figure 3, shows a tooling path (a), which clearly extends into a volume-receiving vertex defined by the transition portion. An oral translation of this reference reveals that the purpose of the invention is to eliminate burrs in the prior art that occurred in the interface between the valve seat (13) and the injection hole (14).

However, Yuji does not explicitly disclose a conical tool used to perform the grinding, even though the tooling path (a) shown in Figure 3 suggests such.

AAPA, as found on page 1, discloses, "In order to provide the sealing surface it is known to provide the seat with a conical portion having a desired included angle. Conventionally, grinding tools with a conical shape are used to grind the conical portion."

It would have been obvious to one having ordinary skill in the art at the time of invention to have performed the grinding of Yuji using a conical grinding tool, in light of the teachings of AAPA, in order to grind the conical surface of the valve seat using a conventional grinding tool.

However, AAPA does not explicitly disclose the axis of the tool is concentric with the axis of the fuel injector.

Gabrielli discloses a method for grinding the seat of a fuel injector (see Figure 4) using a conical grinding tool (22) relying on an automated machining apparatus. The grinding is carried out using a conical grinding pin (22), which is rotated substantially co-axially, to spindle (7) and the nozzle (col 4, lines 1-4).

Regarding claim 7, it would have been obvious to one of ordinary skill in the art, at the time of invention, to have rotated the grinding tool of Yuji/AAPA concentric with the axis of the fuel injector, in light of the teachings of Gabrielli, in order to grind the valve seat in one simple step using an automated machine.

.Regarding claim 2, as shown in Figure 3 of Yuji, the first angle is clearly greater than the second angle.

Yuji discloses the invention cited above. However, the reference does not disclose specific included angle values or the ratio of the first-transverse cross-sectional area over the first area.

Nor does the reference specifically disclose the included angles values claimed by Applicant. Nonetheless, in Yuji the first angle appears to be in the neighborhood of 90 degrees. Furthermore, the first angle is greater than the second angle. The angles affect the flow through the injector.

Similarly, Yuji does not specifically disclose a ratio of the first-transverse cross-sectional area over the first area. This ratio is equal to the outer (i.e. larger) diameter of the sealing portion over the diameter of the orifice portion. Again, the dimensions of the passageways affect the mass flow through the injector.

Regarding claims 3-4, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected specific diameters and included angles of the fuel injector of Yuji since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 6, it is inherent that the grinding tool is driven in rotation about an axis.

Regarding claims 8-10, although select finishes of 0.2-0.5 micrometers are not explicitly disclosed by the references cited, Official Notice is taken that grinding to such a finish is known in the art of manufacturing valve seats.

Prior Art References

3. The prior art references listed on the enclosed PTO-892, but not used in a rejection of the claims, are cited for their teachings of grinding fuel injector seats.

US Patent 2,534,531 to Rossmanith discloses "In the machines hitherto in use, for grinding internal cone surfaces with stationary work piece, a grinding wheel in the cone shape of the hollow cone which is to be ground, is employed, which wheel, during grinding, comes into contact with its whole circumferential surface with the entire surface of the hollow cone" (col 1, lines 2-9). This is essentially the invention of Gabrielle (Figure 4). Rossamanith suggests eccentrically rotating the tool to in order to obtain clean-ground internal surface (i.e. reduce burrs). However, with the provision of the coupling portion (15) disclosed by Yuji to reduce the burr, eccentric rotated tools are not necessitated, since each alleviated burrs.

JP 10-12⁸647 to (TOYO EITEC KK) discloses a method for grinding the seat of a fuel injector. The grinding tool is rotated eccentrically with respect to the axis of the fuel injector. See also DE 2912814 to Grimm (GEHRING), DE 3208536 (GEHRING), and US Patent 4,544,152 to Grimm. As suggested by JP '647 the eccentric action of the tool is necessary in order to remove flash and burrs thereby increasing the surface quality. However, with the provision of the coupling portion (15) disclosed by Yuji to reduce the burr, these eccentric rotated tools are not necessitated.

US Patent 5,601,476 to Meier et al disclose a tool (6) for grinding the seat of a fuel injector (1). The rotation of the tool is concentric with the axis of the fuel injector.

Likewise, GB 2,151,516 to Sasao et al disclose forming tool (17) that is rotated concentric with the axis of the tool (page 2, col 2, lined 89-99).

Response to Arguments

4. Applicant's arguments filed September 2, 2002, have been fully considered but they are not persuasive.

Based on Applicant amendment the new rejection has been cited above. After further review of Yuji, the examiner relies on this reference for a positive teaching of providing a transition portion for providing a better seat surface. Yuji did not disclose a specific grinding tool, although the tool path (a) in Figure 3 is quite convincing as such. Therefore, the Examiner further relied on the teachings of AAPA and Gabrielli for disclosing a conical rotated tool for grinding.

With respect to Grimm, the arguments are moot in light of the new rejection. However, the Examiner generally concurs, as noted above, with respect to references that disclose aⁿ eccentrically rotated grinding tool as teachings away from the present invention.

With respect the overall invention. Applicant's states, on page 1 of the disclosure, that "It is also known that the quality of a surface finish is related to the grinding velocity. In the case of conical shape grinding tools, the grinding velocity decreased towards the apex of the tools" Applicant is merely stating the well-established relative velocity of the tool ($V = R \times \theta$). However, while the relative velocity (V) depends of the radial distance (R), the tool nonetheless rotates at a constant angular velocity (θ). In other words, any

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instantaneous point along the cutting surface, regardless of the radial distance, still rotates at the same rate. Therefore, the actual rate of grinding (or cutting) of the tool is the same at any radial point and related to the angular velocity. Therefore, Applicant's arguments with respect to the differences in velocity of tool do not seem entirely correct, since the relative velocity does not affect the grinding.

With respect to the optimization of the included angles and area, the Examiner has shown that providing a transition portion is known in the art (see Yuji, Claxton, and Grimm). Moreover, Applicant notes, on page 2, lines 12-24, the provision of a transition portion affects the fuel flow resulting in unwanted effects (e.g., accumulation of deposits, sacs volume). Thus, "according to the present invention, a fuel injector seat is **evaluated** as to the necessity and configuration of a transition portion. This evaluation is **based on different factors including orifice size and the included angle defined by the conical seal**" (page 2, lines 16-18). Clearly, Applicant has varied result effective variables in order to optimizing the design of the fuel injector, for which it has been held to be obvious to one skilled in the art. In re Boesch. Applicant argues that the transition portion is provided exclusively to allow for better grinding of the seat. However, Yuji, likewise, discloses that the transition portion (coupling surface 15) is provided to prevent burrs from being formed at the interface of the seat and injection hole (JPO Abstract).

With respect to the Official Notice taken, Applicant has not seasonably traversed the Examiner's statement as to what is known in the art. The Examiner took Official Notice regarding the grinding finish in the first Office Action (Paper No. 5), dated May 9, 2001. Applicant has now only traversed this action, after failing to do so in the previous

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four responses. A seasonable challenge is required in the next reply after the Office action in which the statement is made (MPEP § 2144.03). Therefore, since Applicant did not seasonably traverse the well-known statement during the examination, then the object of the well-known statement is taken to be admitted prior art. *In re Chevenard*, 139 F.2d 71, 60 USPQ 239 (CCPA 1943).

Therefore, the rejections above are valid.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Contact Information

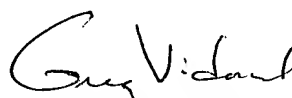
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Compton whose telephone number is (703) 305-0240. The examiner can normally be reached on M-F, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory M. Vidovich can be reached on (703) 308-1513. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9302 for regular communications and (703) 872-9303 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1148.



ebc
October 16, 2002



GREGORY M. VIDOVICH
PRIMARY EXAMINER